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Reciprocal Waves: Embodied Intersubjective Communication in Dance/Movement Therapy Practice

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Abstract

In this thesis project, the author proposes a framework of empathic communication in Dance/Movement Therapy (DMT) practice. Based on Franz de Waal's Russian doll model of empathy, the author explores three traditional phenomena in DMT practice that cultivate empathy and intersubjectivity: Primitive Mirroring; Shared Intention; and Movement Understanding. In each topic, the author extends the investigation into different areas of study in order to illuminate the profound connectedness of human empathic communication. The term Reciprocal Waves highlights the back and forth relationship-building process that occurs daily in dance/movement therapy practice. It is a framework derived from DMT practice that can be applied to all fields that would benefit from promoting empathic human relationships.

Keywords: intersubjective communication, empathy, dance/movement therapy, primitive mirroring, shared intention, movement understanding

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Embodied Intersubjective Communication in Dance/Movement Therapy Practice

As a professional dancer who trained and practiced in many genres of dance and movement-based art forms, dance and movement have become an essential part of who I am. Like many early dance/movement therapists in America (Schoop & Mitchell, 1974; Chace, & Sandel, 1993; Levy, 2005; Whitehouse et al., 2007; Chaiklin, & Wengrower, 2016), I became convinced by the healing power of dance. Not until I entered the graduate program at Sarah Lawrence, did I realize that the therapeutic knowledge had always been within my expressive body. As a dance therapist, the body is the instrument where all magic originates. The body is like a physical channel that receives information from the outer world and also manifests our inner intentions. Through such exchange of information, we communicate and build relationships. The study of dance/movement therapy felt almost like an alchemist journey---discovering something simple but profound. Once, in class, we were instructed to sit back to back to feel each other's breath. I sat down with my partner. I immediately felt her shoulder blades hugging my thoracic spine. With every breath she took, I could feel her shoulder blades opening and closing through my thoracic spine. Without vision, we had a purely kinesthetic and tactile relationship. We felt each other through the other's body; we entrained into a harmonic breathing pattern; we understood each other on a very basic body level.

This is a vivid example to demonstrate the simplicity of an interpersonal harmony. Yet this simple act resonates profound human wisdom. We entered each other's world through attuning to the other's breathing motion. Her embracing shoulder blades welcomed my connection; and my yielding of her bulging breath offered her a nest; her

tender response of my bulging breath signaled me to indulge in such relaxation. There were waves of communicational energy flowing back and forth between us at the moment. Every breath we took, we moved each other and also were being moved. My partner's tender support and bulging push gave me a sense of comfort. I felt safe, sound, and relaxed. Her continuous supportive response also told me non-verbally that she felt the same comfort that I was feeling. Without using any words, we created a shared experience in which we mirrored each other's breath pattern and we both somehow felt a secure sense of comfort.

This phenomenon was described as the "collective body" by Janet Adler (Whitehouse et al., 2007, p. 29). Adler asserts that relationship is the key in all therapeutic acts. Being in a dialogic experience is when individuals join in a unitive state of being. I grew up in the post-Mao China, where a communal experience is the baseline of daily living. The old Chinese wisdom of everything being in one unity strongly influenced my philosophical belief in building connections in us all. I didn't learn that the "collective body" was a choice until I started my life in New York City. Here in the United States, the value of individuality is so frequently stressed that many people forget that we are in fact all connected. Embedded with the ancient Eastern teaching, I am sensitively attuned to the profound meaning of being in a unitive state with all of us, the universe and all sentient beings. Thus the philosophical value of the connectedness in dance/movement therapy rings strongly in my whole being.

When early dance therapists in America formed their theoretical frameworks of working with different populations (Schoop & Mitchell, 1974; Chace, & Sandel, 1993; Levy, 2005; Whitehouse et al., 2007; Chaiklin, & Wengrower, 2016), they came to a

common ground where they believed that dance/movement is the medium that connects us and through which we form relationships. We attune to patients through various sensory organs; we reflect patients' movements or emotional states by mirroring their actions; we empathize with patients through embodying their movements. Marian Chace once said that dance is communication that fulfills basic human need (Lewis, 1979). We humans are social animals that thrive in relationships. The foundation of a relationship is interpersonal understanding, what we also call empathy.

Cultivating empathic communication through bodily movement has been the core of DMT practice (Schoop & Mitchell, 1974; Chace, & Sandel, 1993; Levy, 2005; Whitehouse et al., 2007; Chaiklin, & Wengrower, 2016). Marian Chace used group mirroring and steady rhythms to establish a sense of unity in her DMT groups (Chace, & Sandel, 1993). Trudi Schoop embodied her patients' movement to gain a visceral understanding of the movement and their experiences (Schoop, & Mitchell, 1974; Levy, 2005). Mary Whitehouse and Joan Chodorow witnessed their patients' movement through reflecting the movement internally (Whitehouse et al., 2007). Janet Adler attuned to her patients by mimicking some elements of their movements (Levy, 2005). Through these simple yet profound ways of communicating, dance therapists quickly build therapeutic relationships with a high degree of empathy (Chaiklin, & Wengrower, 2016). There are common threads here which may form a framework for highlighting the embodied dyadic communication in dance/movement therapy.

Reciprocal Waves

Dance/movement therapy is an embodied healing tool that emphasizes body/mind and self/others connections. It is a relatively recent practice in America that has been

built on ancient body/mind practice, Western psychological theories and several generations of dance/movement therapists' clinical/theoretical development (Levy, 2005; Whitehouse et al., 2007; Chaiklin, & Wengrower, 2016). For me, dance therapy is not only a psychotherapeutic treatment method to be used in clinical and educational settings, but also a humanistic philosophy that stands on the foundation of human connectedness. In dance/movement therapy, body/mind and self/others connections are highlighted. An integrated body/mind allows a smooth pathway between mental process and physical manifestation. Many ancient and modern somatic practices are developed upon the belief that manipulation of the mind affects manifestation of the body, and vice versa (Yang, 1987; Cohen, 2008). The connectedness between self and others follows a similar logic. One's expressions can influence others' and can also be affected by others'. Furthermore, body/mind and self/others connections are tightly associated as well. What happens in body/mind linkage closely impacts self/others relationships, and vice versa. Thus, in this interaction of interdependence of body/mind and self/others, I see the ever-flowing waves of water pushing and yielding. From such flow, empathic connection is powerfully generated between humans, animals, and all sentient beings. Dance/movement therapy is like an engine for motivating and activating the empathic connectedness between our body/mind and self/others.

This idea of generating the ever-flowing water that runs between body/mind, and self/others is deeply influenced by I-Ching's polarity theory and Taoist water metaphor (Wilhelm & Baynes, Trans., 1997; Lao-tzu, 1986). The polarity theory emphasizes that the reciprocal movement between numerous combinations of dyads creates us and the world we are living in (Wilhelm & Baynes, Trans., 1997). Contemporary neuroscience

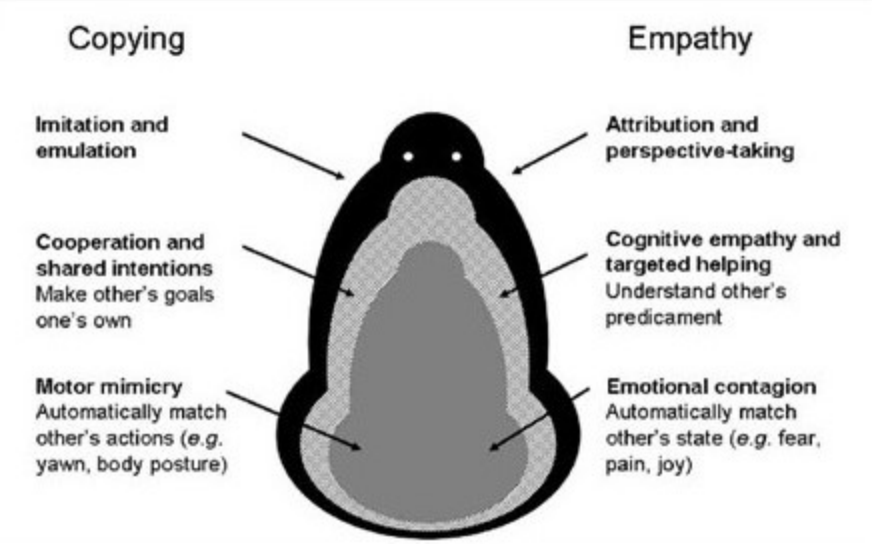
has demonstrated that the neurotransmitters that travel reciprocally between two or more points are the fundamental movement of our central nervous system (Llinas, 2001). Western studies in developmental psychology show that human communication is built upon the nature of intersubjectivity, which is a coordinated movement between self and others (Stern, 2004; Braten, Ed., 2007). The ancient Chinese wisdom of seeing the ever-changing movement in between two or more elements is, in fact, the foundation for capturing the simple yet profound action of empathic connections. Mutual understanding in communication requires two moving elements simultaneously receiving and acting. This creates this back-and-forth movement of interacting. In addition, water is the symbol for flexibility and soft power in Taoist philosophy (Lao-tzu, 1986). The use of the word "waves" is to capture the movement of water and its plasticity for change. The invisible waves during communication are ever-changing and impactful. The term Reciprocal Waves is developed to represent the moving energy between body/mind and self/others.

Method

Empathy means the ability to understand and share the feelings of another. The English word empathy originates from the Greek word *empatheia*, which contains *em* (in) and *pathos* (feeling). The Greek version vividly demonstrates the intersubjective state of being in somebody else's feelings. Empathy in Chinese literally means "the same sensation/feeling." Empathy is essential in many aspects of our lives (Stern, 2007). Imagine if you couldn't feel the joy in a smile; imagine if you couldn't sense the grief in someone's sobbing; imagine if you couldn't read a terrified expression; imagine if you couldn't understand someone else's pain. Life would be monotonous and isolating. The capacity for empathy lays the foundation for basic social skills, affective interactions,

language learning, human morality, social cooperation, and intimate relationships (de Waal, 2003; Stern, 2007). In some forms of psychopathology, we see that lack of empathy could be detrimental for overall mental health, such as with anti-social disorders, some personality pathologies, types of schizophrenia, and autism (Stern, 2007).

Dutch ethologist Franz de Waal studied empathy both in humans and primates extensively (de Waal, & van Roosmalen, 1979; de Waal, 2003, 2007). He discovered that there are various evolutionary layers in empathy. As a biology-oriented scientist, de Waal is interested in how human empathy has been evolved to define who we are now. The design of a Russian doll is favored by many biologists for its illustrative structure of one layer being built upon an inner one (de Waal, 2003, 2007). Empathy, like many other human biological traits, has been tweaked through thousands of years of evolution for efficient adaptability. Modern humans' ability to predict what others want to say in language has evolved to feed our needs in linguistic communication. However, such a sophisticated way to empathize with others has been built upon the more primitive ones, the ones we share with many other kinds of primates, and social animals (de Waal, 1996, 2003, 2007). Like a Russian doll, the primitive traits (inner layers) always remain present in the more advanced ones (outer layers). To trace the evolutionary layers of empathy, de Waal proposed a bottom-up framework to examine empathy, using the structure of a Russian doll. In his Russian doll model of empathy, the advanced, more complex layers, of empathic communication are elaborated, and built upon, the more primitive ones. Below is a diagram of the Russian doll model of empathy:



Note. Adapted from "The 'Russian doll' model of empathy and imitation." by F. B. M. de Waal, 2007, *On Being Moved: From Mirror Neurons to Empathy* edited by Stein Braten, p. 60. Copyright 2007 by Amsterdam/Philadelphia: John Benjamins.

De Waal concludes that emotional contagion stands at the core of empathy. Through his studies in animals, especially primates, he noticed that emotional linkage is the basis for many organized group behaviors. The basic manifestation of emotional contagion is motor mimicry, which can also be called automatic imitation. For example, if one animal in a group feels startled, then the rest react upon it by automatically mimicking the startled action. This ability is crucial in all social animals' survival. One sheep in a herd detects the presence of a predator, and starts running frantically away from the danger, then the rest of the herd follows this action by running frantically towards the same direction as the leading one; the ability to feel the fear from others, and automatically mimic the action, plays an important role in staying alive.

Norwegian social psychologist Stein Braten and Scottish child psychologist Colwyn Trevarthen have studied a similar phenomenon in infants (Braten, & Trevarthen, 2007). They named this core stage of empathy "primary intersubjectivity." This basic level of feeling what others feel manifests in early mother-and-baby interaction. Like

many social animals who entrain with others' emotions and actions, we humans, from a very early age, as early as newborns, interact with others through automatic mimicry. In Braten and Trevarthen's study of primary intersubjective communication, interactions between mothers and babies are described as a well-coordinated circular dance (2007). Infants as young as less than one hour old can engage in reciprocal *protoconversations* through auditory and visual imitation. This core empathy exists not only in the animal world and early stage of humans, but is also common in adults' daily life: we widen our mouths out of awareness when we see others' in a joyful act. At this stage, empathy appears as a reflex-like transmission of emotions; the involuntary reaction (both inner and outer automatic mimicry) may not involve any conscious understanding of the perceived emotions or actions (de Waal, 2007).

In order to keep evolving as social animals, humans and many kinds of primates must be able to help those in need in order to grow the tribes as large and strong as possible. Based on this essential emotional linkage, we use shared feelings to understand others' intentions. In the primate world, the phenomenon of targeted helping has been closely studied (de Waal, & van Roosmalen, 1979): chimpanzees are able to predict others' intentions and needs through their movement and offer tailored help for each situation. Through understanding each other's need, a shared intention is formed organically. De Waal labeled targeted helping as a form of cognitive empathy. He hypothesizes that one has to have a high level of self-awareness to distinguish others' emotions and intentions from one's own. This is not only evolutionarily more advanced than automatic mimicry, but also developmentally more mature. The phenomenon of shared intention can be found in many toddler social behavior studies (Meltzoff, 1995;

Brooks and Meltzoff, 2003, 2007; Braten, & Trevarthen, 2007). Children as young as 18 months old can understand others' intention in an object-related act (Meltzoff, 1995). We often see that young children join in each other's playful acts through either manipulating an object or forming relationships with an imaginary figure collectively. Many child psychologists argue that the object-oriented interaction is the key for the formation of a shared experience between two or more subjects (Meltzoff, 1995; Brooks and Meltzoff, 2003, 2007; Braten, & Trevarthen, 2007). Through forming a shared intention in a dyad or group, social cooperation takes its initial shape.

At the outer layer of the Russian doll model is perspective taking, which is probably the most familiar form of empathy for adult humans. Human adults are capable of intellectually processing others' opinions and perspectives through interpreting verbal and non-verbal languages. While the core and second layers of empathy are mostly involuntary and automatic, this more advanced form of empathy allows us to voluntarily participate in others' mental process (Braten & Trevarthen, 2007). We use imagination to relate to others' situations through recalling related memories and past experiences. With this ability, we are able to think like others, and act like others. This kind of intersubjective imagination is only unique to homo sapiens, and may also be the key of our dominance on earth for the past fifty thousands years (Harari, 2018). De Waal stresses that this more sophisticated intersubjectivity has to be motivated by the basic form of empathy, which is emotional contagion (de Waal, 2007). Like a Russian doll, the outer layers contain the traits or influence of the inner ones: mental simulation or cognitive understanding is based on emotional linkage. This is a relevant reminder as we often replace our gut feelings with intellectual thinking in interpersonal communication.

It is important to remember that empathy acts as both emotional and cognitive linkage in intersubjective understanding.

The organization of this thesis will follow the thread of de Waal's Russian doll model of empathy: primitive mirroring as the core of empathy; shared intention as the cognitive empathy form, and movement understanding as the advanced layer of perspective taking. Every category is chosen in response to some well-known DMT methods. In each section, I will first define the title; then I will look at related studies from developmental psychology, neuroscience, ethology, cognitive psychology, movement science, and expressive arts to explore the holistic understanding of the title. At the end of each section I will connect all related studies to a discussion of general DMT practice with my own clinical experiences. At the conclusion of this thesis, I hope to explore more possibilities to apply this framework in various fields.

Primitive Mirroring

Primitive mirroring is also called automatic mirroring, which is when one imitates others' motor actions involuntarily and unconsciously. Italian neuroscientist Giacomo Rizzolatti and his team defined primitive mirroring as an imitative mechanism to react to a body action or movement without understanding the meaning of it (Rizzolatti et al., 2001). This automatic mimicry is usually generated by strong emotional linkage between two or more subjects. This kind of mirroring response is so primitive that it can be observed in both animals and humans. Automatic mimicking response is a reflex-like transmission, like a flock of birds taking off because one of them is startled by a predator (de Waal, 2007).

A similar phenomenon can be found in early childhood. Developmental psychologist Daniel Stern claims that imitation is our innate capacity to experience what another is experiencing (Stern, 2004). According to Stern, motor mimicry is the foundation for all interpersonal acts (Stern, 2004, 2007; Braten, 2007). Braten, too, argues that this primitive imitation is essential in social learning and community forming. Mothers and babies communicate with each other through primitive mirroring. Babies copy mothers' movement and mothers responds to their babies through mimicking their rhythms. This back-and-forth matching between mother and baby creates a well-coordinated rhythmic pattern between the two subjects. Schogler and Trevarthen poetically described the mother and baby communication as "to sing and dance together" (2007, p.281). Through their extensive studies on mother-and-baby attunement, it has been demonstrated vividly how we humans, at as early as the infantile stage, use our intricately mobile bodies and well-coordinated movements to connect with others. This kind of primitive communicating with others through non-verbal matching is claimed to be the core of empathy (de Waal, 2007).

In this section, I will look at imitation in protoconversation -- early non-verbal communication between an adult and a baby -- and its relationship with studies of mirror neurons to discuss how primitive mirroring is usually the first step of building a therapeutic alliance in dance/movement therapy practice.

Imitation in protoconversation.

Many child psychologists describe the mother and infant communication as a musical symphony (Malloch et al., 1997; Stern, 2004, 2007; Braten 1998a, b, 2007; Braten, & Trevarthen, 2007; Schogler, & Trevarthen, 2007). Because infants have not

developed the ability to communicate via verbalization, almost all communication in early childhood is non-verbal. Non-verbal communication contains reciprocal exchanges of gestures, sounds, and tones of the voice. Malloch and colleagues analyzed vocal exchanges in protoconversation and discovered that the dynamics of a mother's voice match her infant's arm movements (Malloch et al., 1997). The teamed recorded several cases of mothers singing to babies, and then analyzed the duo's singing & response pattern. Babies' arm gestures and imitative vowel sounds precisely matched their mothers' singing pitches and speed, and sometimes babies' gestures were a tiny bit ahead of their mothers' voice changes. This discovery demonstrates that babies automatically engage with mothers' voices through primitive mirroring, and mothers potentially mirror babies' response to modulate the speed of the voice. Without too much conscious effort, mothers and babies naturally coordinate with each other in a reciprocal dance. Meltzolff and Moore (1983) reported that newborns as young as forty-two minutes old imitate facial acts. This study indicates that a healthy newborn has the ability to mimic others' action without understanding the meaning of it. This experiment also demonstrates that our exteroception and proprioception are tightly associated at birth. Exteroception includes all senses that receive stimuli from the outer world, such as vision, hearing, olfaction, taste and taction. Proprioception is our inner perception with which we sense things like muscle tension, organ movement, and blood flow. Without registering what the movement means, we could copy the exact movement through visually perceiving it, like the newborns in Meltzolff and Moore's study; or could match up with the sound we hear by moving our bodies accordingly, like the mother and baby symphony in Malloch et al.'s study. Stern portrays such reciprocal matching exchange as "participating in an

aspect of the other's experience" (Stern, 2004, p.81). Mothers mimic their babies' sound and movement to enter the babies' world; babies participate in their mothers' experience through copying the mothers' rhythms and motions. Clearly, we use primitive mirroring as our first tool to communicate with the outer world.

This kind of primitive motor mimicry not only happens in the early stage of our lives, but also occurs in adult intersubjective communications. As mentioned earlier, in de Waal's Russian doll model of empathy, the advanced forms of empathy are always built upon the primitive ones. Although adult humans have more developed layers of empathy, the fundamental ones have to exist for the developed forms to grow. In daily lives, we constantly use primitive mirroring to participate in others' experience. Braten provides an example from a lecture he gave in 2003: while showing a video of a newborn (20 minutes old) imitating the wide mouth-opening action of the researcher, some members of the audience opened their mouths out of awareness (Braten, 2007). The audience was emotionally moved by the mouth-opening action and joined in the experience automatically. Braten provides another example of this phenomenon: the Norwegian princess, who was sitting in the spectator box at the summer Olympics 2000 in Sydney, jumped high in the air while watching her horse, ridden by an Englishman, jumping high to cross the last high obstacle. The princess is obviously emotionally attached to her horse, so during the performance, she couldn't help but jumping with the horse as if she were participating the action with her horse. Corinne Jola, a choreographer, and cognitive neuroscience researcher shared her personal experience in *The Neurocognition of Dance* (Jola, 2010, p.220):

> *When I watch my performers in rehearsals, I simulate their actions independent of whether I have only visual or motor familiarity with the movements. Usually, friends and collaborators who are observing my rehearsals are amused by my head and facial expressions accompanying the dancers.*

When we are emotionally involved with a person or a situation, we physically join in their experiences as if we become parts of them. The primitive mimicry ability allows us to feel others' experience in our own bodies and movement.

Mirror neurons and primitive mirroring.

In 1996, a group of Italian neuroscientists reported finding what they described as mirror neurons in a sector of the ventral premotor cortex (area F5) of macaque monkeys (Gallese et al., 1996). The scientists observed that this group of visuomotor neurons were discharged not only when the monkey executed goal-directed hand and mouth movements, but were also activated when it observed a similar action performed by the experimenter (Gallese et al., 1996; Rizzolatti et al., 1999, 2001, 2002, 2006). This finding suggested that there is a neural mechanism that allows a direct matching between the visual description of an action and its execution. Since then, many studies of mirror neurons in monkeys and humans have been done to examine the "direct-matching hypothesis" (Fogassi et al., 2005; Iacoboni et al., 1999; Jarvelainen et al., 2004; Rizzolatti et al., 1999, 2001, 2002, 2006).

In related human studies, researchers have observed different brain activities in action observation with understanding of the meaning and action imitation without understanding of the meaning (Grafton et al., 1996; Decety et al., 1997). When observing an action to understand its intention or goal, there is an activation of the left inferior

frontal lobe; whereas, when participants merely imitate the actions, the activation is mostly located in right parietal operculum. The inferior frontal area portrays the perceived action in terms of its motor goal, such as grasp the bottle, reach the arm high, step forward, etc. without defining the detail of the action. However, the parietal lobe area codes the detailed kinesthetic information of the movements, such as how much force is needed in grasping a bottle, how high the arm should be raised, how far the step should be taken, etc. These studies demonstrate that one doesn't need to understand an action's intention to imitate it. The somatosensory mapping of the activation of the parietal lobe during action imitation suggests that proprioception is required and highly utilized when one physically copies a movement.

Iacoboni et al.'s (1999) experiment on "observation only" and "observation/execution" found that the left inferior frontal cortex (Broca's area), right anterior parietal region, and right parietal operculum were much more strongly activated during the imitative condition than during non-imitative conditions under the observation/execution category, and, most importantly, that the right parietal operculum became active only during the imitative condition. Again, the parietal lobe was the dominant region in action imitation. This study further demonstrates that one's internal sensorimotor mapping is the basis for physical mimicry.

When the newborns mimicked the experimenter's facial actions, such as lip protrusion and opening, and tongue protrusion (Meltzolf, & Moore, 1983), did they know the goal of the movement or did they copy the movement purely from their sensory mapping in the parietal operculum, or both? I propose here that since babies don't have learned cognitive motion memories yet, it is most likely that the parietal operculum is the

primary receptor that allows them to imitate the experimenter's facial actions. The mirror neuron studies mentioned above also resonate with the theory that exteroception and proprioception are tightly associated when we are born. This close association demonstrates the interdependent relationship of self/others. Our inner sensory map automatically reflects what we perceive in the outer world. This primitive way of mirroring the external stimuli is the foundation of how we connect with others. Rizzolatti and colleagues suggest that this kind of imitation is an ancient function that can be found in many species (Rizzolatti et al., 2001). They believe that imitation can happen with or without an understanding of the meaning of the action. Although the imitative response is not cognitively processed, neurological studies indicate that kinesthetic mapping and visuomotor connection are active during physical imitation. In Braten's story of the Norwegian princess unconsciously jumping while watching her horse jumping, the visual information stimulated her physical copying of the same movement as her horse. The action of jumping wasn't a deliberate motion but an automatic proprioceptive reaction of attending to her horse's or the English horse rider's experience.

Primitive mirroring in dance/movement therapy practices.

Primitive mirroring is the foundation of all embodied intersubjective communication in dance/movement therapy practice. Dance therapists utilize this powerful tool to connect with patients. Marian Chace mirrored patients' energy level and quality of movement to start a session (Chaiklin, & Wengrower, 2016). Like mothers unconsciously mirroring their babies' expressions to enter their worlds, Chace consciously attuned to her patients through matching their movement attributes. Through such imitation, patients' motions reflected on her body were perceived by the patients,

thus the patients would have felt joined by her. According to mirror neuron findings, patients' motion patterns were precisely reflected on Chace's internal sensory mapping, therefore Chace and her patients were sharing a similar proprioceptive experience. Such mirroring act initiated by Chace sent a gentle non-verbal signal to the patients as if she were saying: "I see you and I am with you." Chace used primitive mirroring to initiate communication. Another example is a story from Trudi Schoop's about her work with a patient named Luke. Here is their first encounter:

> *When Luke and I were seated opposite each other and he began his talismanic mannerism, I picked it up the second time around. Carefully and precisely I made the horns, bowed, sliced at my neck and brushed the top of my head. There was a pause. Luke's eyes were still downcast. He repeated the pattern and again I followed it. We did it a third time. Luke raised his head. His eyes looked straight into mine. And he smiled. I smiled back.* (Schoop & Mitchell, 1974, p.169)

Luke went from the total isolation to a dyadic communication with Schoop. The interaction was activated by Schoop's persistent mimicry of Luke's movement, as if she were continuously saying: "Hey, I am interested in you and I want to know more about you!"

Therapeutic alliance is a two-way interaction. In addition to initiating the mirroring process, dance therapists also activate or motivate patients' primitive mimicry ability. Human infants start their exploration in the world through mimicking others' motions. The direct matching between external stimuli and internal kinesthetic mapping establishes the crucial foundation for interpersonal connections. Like the role of parent, dance therapists not only initiate the mirroring mechanism, but also evoke the hidden or

blocked mirroring ability from the patients. Irmgard Bartenieff emphasized the necessity to stimulate and mobilize patients' movement impulse (Levy, 2005). She used many creative ways to help motivate patients' motor response. Schoop incorporated theatrical expression in her interactions with her patients and argued that therapists should be like actors who embody and express feelings fully to move the audience (Levy, 2005). When patients start responding to therapists' engaging effort with automatic mimicry, we know that we have established the initial stage of a reciprocal communication.

In my clinical experience of making connections with new patients, primitive mirroring plays an essential role. During my internship at a state psychiatric center, I had to visit five different settings on campus every week. This meant that I would need to meet many patients from those settings and build rapport with them. Because of recovery cycles and new admissions, I would meet new patients every time when I was on site. Imitating their rhythms and gestures, or motivating them to respond to my expressions, was constantly utilized in my communication with new patients. I would either join their small gestures to tell them non-verbally that I was with them; or I would exaggerate my expressions to inspire them to join my emotional experience. Tortora stresses that to "match-feel the movement qualities through attunement and mirroring" (quoted in Levy, 2005, p.182) has always been the first step to establish a therapeutic relationship with patients. This has been true in my experience. What dance therapists do in empathic communication with patients mirrors what caretakers do with their babies. Like the mother and baby symphony in Malloch et al.'s study (1997), dance therapists are recreating the early mirroring experiences with patients to re-build interpersonal trust (Levy, 2005). Mothers' imitation of babies' movement reassures the babies that they are

joined and they are not alone. Babies' mimicry of mothers' rhythms informs the mothers that the babies are curious and engaged. The reciprocal imitative pattern is like a circle, where there is no start or end point. Who starts or who follows becomes blurry in the process of primitive mirroring. The circular dance keeps evolving and the subjects are fully submerged in each other's experiences.

Furthermore, physical imitation activates the somatosensory part of our brains, which means that we are also getting a visceral sense of the imitated source. According to some mirror neuron studies on action observation and imitation (Grafton et al., 1996; Decety et al., 1997; Iacoboni et al., 1999), the kinesthetic mapping is present no matter whether or not one understands the meaning or intention of the movement. It is basically like one entering the other's body to experience what the other is experiencing viscerally. This physical matching phenomenon is as intimate as it sounds. Proprioceptively understanding each other is how we engaged with the world when we were first born. This is how dance therapists begin an empathic relationship with patients.

Shared Intention

Shared intention between a couple or among a group of people is the second layer of de Waal's empathy model (de Waal, 2007). Developmentally speaking, this step is also called joint attention (Braten, &Trevarthen, 2007), which is an object-related engagement where the dyad or group shares the same visual attention. When babies are around nine months old, they are able to follow others' gaze and explore the world through object-oriented participation (Meltzolff, 1995). Through shared gaze, babies learn what others are seeing as if merging into others' world. The ability to join in others' visual attention is crucial in humans' cognitive and social development (Brooks &

Meltzolff, 2002, 2007). We learn abstract names of various objects in our surrounding environment through joining others' attentions. Adults point out dangerous items in the room to caution children to stay away from them. If the children couldn't attend to the same item on which the adults are focusing, then they might end up in playing with a dangerous item and potentially hurt themselves. Mature adults are also able to participate in others' abstract world as well, such as with a shared imagination or idea. It's hard to imagine engaging in a conversation without attending to the same topic referenced by the partner. Joint attention is also an important tool in building social skills. To join in others' visual experience is to share what others see in the world. While primitive mirroring keeps the experience in between subjects, joint attention brings the relationship out to the world. The object is a referential point which connects the two or more with a shared focus. When a joint attention is established, it makes possible a joint experience with a shared intention. Meltzolff and Brooks' work on joint attention and intention prediction in young children has demonstrated that humans are capable of understanding others' intentions non-verbally at a very young age (Meltzolff, 1995; Brooks & Meltzolff, 2002, 2007).

The objects in such triadic relationship can be tangible or abstract. Recognizing others' emotional or social needs can be understood as the abstract object in joint attention; then this shared imaginary attention prompts one to help or join in another's act. In de Waal's empirical study of cognitive empathy in primates (de Waal, & van Roosmalen, 1979; de Waal 2002, 2007), he noticed that some chimpanzees help others who are in need through non-verbal reading. When some members express sadness, helplessness, or frustration, the others can read their emotions and offer help for what

they need. Here the read emotion is a shared attention, and this shared idea of the emotion creates a shared intention among the group, which is to help alleviate the distress. De Waal explains that to achieve this cognitive level of empathy, one needs a high degree of self-awareness. During primitive mirroring, one might synchronize with the other and there is no need to distinguish the difference between self and the other. However, in order to understand another's intention, one has to know that the source of an emotional state is not oneself but the other, and one has also to be able to join in the other's world to understand why the emotion occurs. Built upon emotional contagion and motor mimicry, shared intention emerged for targeted helping and social cooperation.

In this section, I will unfold the idea of shared intention through joint attention and intention in young children and targeted helping in primates. Later, I will elaborate on the shared intention phenomenon in dance/movement therapy practice, illustrated with my personal experiences.

Joint attention and shared intention.

Developmentally speaking, "embodied simulation" (Gallese, 2005), or primitive mirroring, is present at birth (Brooks & Meltzoff, 2007). As we move into the first year of growing, gaze following is primarily developed through following mothers' or caretakers' visual attention. Infants attend to others' targeted interests to begin the understanding of others' intentions. In Brooks and Meltzoff's study of infants' gaze following (Brooks & Meltzoff, 2002), the subjects (infants age 12, 14, and 18 months) carefully observed the adult who sat across from them; when the adult turned her focus on a still object to her left with open eyes, the infants followed the adult's gaze to the targeted object and often pointed to it. This observation tells us that human infants as

young as 12 months- old are aware of the third-party (the object) introduced by the caretakers and are able to cast their gaze to external objects in the environment. Thus a "preverbal referential triangle (Brooks & Meltzoff, 2007)" is created: mother-baby-object. The mother's visual attention refers infants to specific external objects.

Gaze following allows infants to attend to others' points of view and share the same perceptual experience. With the foundation of gaze following and experience sharing, can infants understand the intention behind an object-related manipulation? In another study, Meltzoff (1995) showed three groups of infants an unsuccessful act of a bell toy assembly under three different situations: 1) after a demonstration of the whole manipulation; 2) after an unsuccessful attempt of the act; 3) none was demonstrated or attempted. Infants who were shown either the full manipulation or the unsuccessful attempts completed the target act of the bell toy assembly at a much higher rate than the controls to whom nothing was demonstrated. The results from the study demonstrate that 18-month-olds can not only understand the goals of an object-oriented manipulation but can also infer the underlying goals from unsuccessful attempts. Humans from a very young age are able to detect an unfulfilled task and help complete it. I would say that the capacity of understanding each other's intention in a participatory experience is the prelude for social cooperation. The object-related experience provides a fertile ground for our "participant perception"(Braten, 2007), which allows us to join in others' experience through a shared intention.

Targeted-helping in animals.

Dutch Ethologist Franz de Waal and Primatologist Angeline van Roosmalen studied a behavior known as "consolation" among chimpanzees (de Waal & van

Roosmalen, 1979). Consolation is a "friendly, reassuring contact" (de Waal, 2007, p. 56) conducted by a third-party bystander toward the loser of a fight. In one of their observed samples, a juvenile put his arm around an upset adult male who had just lost the battle with a combatant. De Waal believes that this kind of targeted helping and consolation require a high degree of self-awareness. When the adult male chimpanzee appeared upset and frustrated after being defeated in a fight, the juvenile could understand this adult male's emotional state and offer his consolation. Evolved upon the basis of emotional contagion, this is the more advanced cognition of empathy: understanding the source of an affective state is not within oneself but in another, and attending to the other's need. De Waal calls this phenomenon "cognitive empathy" (2007, p.61).

Cognitive empathy enables primates to evaluate and predict another's situation. When a juvenile chimpanzee gets stuck in a tree and screams for help, the mother tailors her aid by standing on the higher ground near the tree and reaching out her arm to her son (de Waal, 2007). To be in tune with others' intentions is crucial for social animals' survival. Not only ape mothers attend to their offspring's needs by understanding their situation, but peers also evaluate each other's intention based on emotional linkage and together form the group cooperation. In de Waal's observation, one young chimpanzee joined an unrelated adult to help her move a heavy metal drum. This young chimpanzee understood the other's behavior and intention of moving the drum from one location to the other and attended to her need by helping her roll the drum.

We can make connections between this targeted helping phenomenon in chimpanzees with the joint attention behavior in young children. In Meltzolff's experiment on object manipulation (1995), the referential triangle contains demonstrator,

child, and object-related act; in de Waal's empirical study of targeted helping, the referential triangle includes one in need, helper, and an abstract task. Although in de Waal's study a tangible object is not necessarily present in all cases, an abstract task, such as helping others roll a drum or helping the juvenile reach for food, is always the source of the connection. In both examples, one detects the intention of an act done by others. The intention could be completing an object manipulation act or helping peers roll a drum. This connection shows that both apes and humans can put themselves in others' experiences and understand others' needs. With this more advanced layer of empathy, we can not only enter each other's visceral experience, but also share an intention and work on it collaboratively.

Shared intention in dance/movement therapy.

In both group and individual dance/movement therapy sessions, creating a shared experience among the group or dyad is crucial. Chace, for example, used rhythmic music to connect the group as a whole (Chace & Sandel, 1993). In the midst of abstract movements among a scattered group, following the beat of the music creates a joint attention among all group members who can hear the music and also helps establish a shared intention toward which everyone in the group works collectively. The auditory rhythm here is the referential point shared by the group. The group following the same rhythm represents that they are temporarily in a unitive state of participating in the same musical rhythm. Such communal sharing experience helps create a strong sense of social belongingness for group participants. In the primitive mirroring model, the connective affirmation is represented through imitation; here the shared intention of "we are here together" is developed through following the same rhythm.

When working with a young male patient diagnosed with catatonic schizophrenia and mental retardation, Chaiklin used various props to engage him (Levy, 2005). She mentioned that props not only helped this patient increase his movement choices, but also motivated him to keep his eyes open throughout the session. For a young man with a diagnosis of catatonic schizophrenia, interpersonal interaction might have been inaccessible. Chaiklin invited him to explore different qualities of movement through various props. In this case, stretchy rope, hoops, streamers, or balloons were Chaiklin's motivation-extension. With the presence of different shapes and qualities of objects, this young patient was able to engage with the therapist and stay present throughout the session. Here, props were non-threatening mediums that helped create a joint attention between the patient and therapist in the moment.

As a dance/movement therapist, using a tangible object to create a shared experience with one patient or a group of patients can be reinforcing. One of my favorite objects is a beach ball. Its lightness and colorfulness are kinesthetically and visually gentle and pleasant. If I see a group that is passive or unfocused, I'd bring the beach ball out. As soon as the colorful ball is out, people's attention immediately goes towards it, like the babies in Meltzolff and Brooks's experiment of gaze following (Brooks & Meltzoff, 2002). The beach ball becomes a shared group focal point where the previously scattered group establishes a group connection. This invisible net is created by the group's joint attention on the colorful beach ball: I am seeing what you are seeing, he is seeing, she is seeing, and they are seeing; we are attending to the same object. The group is brought back to the primal stage where a referential triangle is the foundation to establish interpersonal bond. Long-term psychiatric patients generally suffer from the

regression of their cognitive abilities, and many of them are internally occupied with their own hallucinations and delusions. Thus, it could be very challenging for this population to focus on a shared abstract idea. If the same scattered group of long-term psychiatric patients were verbally asked to focus on an imaginary beach ball, it would be nearly impossible to turn their attention to the abstract idea. Therefore, the beach ball's physical presence is quite crucial in helping form a joint attention among group members. As mentioned earlier in this section, joint attention is the foundation for cognitive and social development.

Built upon this shared gaze, I point the ball towards one person in the room to indicate that I will toss it to the person. If the person responds to my action with a smile or extended arms, I toss it to him/her. After witnessing this exchange, other people in the room start extending their arms to indicate that they want to receive the ball as well. Then the whole group is activated by the intention of a simple act of ball tossing/catching. All of this is done mostly through movement representations: from introducing the ball to the group to gain their attention, to establishing a shared intention among the group. The ball is tangible, and the intention of tossing and catching is an abstract idea formed by us. When I dab the ball towards a person, how does he/she know my intention of tossing and his/her responsibility of catching? Our past memories of seeing a beach ball are generally related to tossing and catching. I will talk more about how previous experiences affect our non-verbal perception in next section. Here, an imagined act of tossing-catching seems universal. The physicality of a beach ball extended the group's joint attention to a shared intention. Like the 18-month-olds in Meltzoff's study (1995), a passive and unfocused group of psychiatric patients can usually infer the shared intention of ball

tossing/catching through visually perceiving the ball. Therefore, a prop that can create a shared focus among the group participants centers the whole group and helps establish a shared experience (Erfer & Ziv, 2006). Using a beach ball to create group participation visually or kinesthetically is a vivid example of how the capacity for joint attention that develops early in life (Brooks & Meltzoff, 2002) can be traced in adult social-forming interactions, and how creating a joint attention in a group can help establish a cohesive group experience. Furthermore, the motion of tossing/catching resembles the precision of the reciprocal dance in intersubjective communication. The moving ball makes the communicative tracing visible, making the movement between two poles apparent. Here, reciprocal waves are activated by the presence of a colorful beach ball.

Besides using joint attention to create an object-related participation, we humans, among all other primates, have an innate sense of attending to others' needs (de Waal, 2007). This targeted helping ability enables us to form social cooperation in order to thrive as a group. In my personal experience working with pre-school age children, the urge for joint group effort is evident. One day in our first year fieldwork, my classmates and I were co-leading a dance therapy group with a group of three-year-old children at a pre-school. The class is ethnically diverse and not every child speaks English. Through the development of the group on that day, we somehow ended up with me being a monster. One boy in the class started shouting: "fight the monster." He initiated the action of beating me, then the whole group gathered and joined the endeavor of fighting the monster. At this moment, one girl suggested that they should build a cage to keep the monster inside. One child began bringing a chair to contain me; then the whole group joined the group effort to fence the monster by using the chairs. This brief vignette

clearly demonstrates the ability of group cooperation in three-year-olds which was generated by intention prediction and targeted helping.

Like the chimpanzees studied by de Waal, three-year-old humans are able to read others' intentions non-verbally and join in the group effort. In this case, the group intention was self-defense. Archetypally speaking, defending against the enemies represented by unknown monsters or other human tribes is essential for survival. I doubt that all the children in that classroom had experiences of hunting outdoors. However, self-defense is embedded in our psyche, where we intuitively know that we have to defend together as a group when a foreign monster is present. In clinical dance therapy practice, we can motivate and encourage participants to find the group intention by using the word "help." Based on elicited movement or motion intentions, we use the helping mechanism to generate the group's participation towards one shared goal. If one participant expresses that he/she is reaching for happiness with upward extended arms, we would call on the whole group to help him/her reach for happiness. When one expresses having confusion or challenge in the group, we would generate everyone's idea to help solve the problem. In both the primate and human world (de Waal, & van Roosmalen, 1979; de Waal, 2002, 2007), "help" is a magical word for cultivating interpersonal empathy and group cohesion.

Movement Understanding

In the Russian doll model of empathy (de Waal, 2007), the most advanced form of empathy is interpersonal perspective taking. We establish mutual understanding through predicting and interpreting others' emotions and intentions (Braten, & Trevarthen, 2007).

We perceive and interpret others intentions mostly through reading each other's non-verbal expressions. Non-verbal exchanges are essential in human communications (Hall, 1992; Llinas, 2001; de Waal, 2004; Braten, 2007; Moore & Yamamoto, 2012;). Understanding others' non-verbal expression is like building a bridge to connect to their inner intention. Here in this section, I am mainly focusing on how movement understanding boosts social empathy.

Meltzoff and Brooks (2007), blindfolded a group of 12-month-olds, and later took off those blindfolds and put the infants with a blindfolded adult. Since this group of infants had experienced the perception of not seeing anything with the blindfolds, they did not follow the adult's head movement (an indication of gaze changing). In contrast, the control group was given a blindfold cloth with peeking window through which the infants could see. When presented with the blindfolded adult, the control group still followed the adult's gaze. Both groups used their first-person experience to interpret the observed adult's head-turning movement. Their intrasubjective experience changed their perception of the other's situation. Normally, when a young child perceives an adult's head-turning motion (Brooks & Meltzoff, 2002), the young child follows the adult's gaze change immediately to a specific stimulus. However, in this experiment, both groups were given a condition of seeing: one group was totally blindfolded, the other could peek out under the blindfold. After they each experienced their unique conditions of seeing, this piece of information was stored in their perceptual memory. Then, when they visually observed others in the same condition, both groups of 12-months-olds used their previous subjective experience to interpret the others' action. This suggests that the ability to draw on our own personal experiences to understand the behavior of others is

the foundation of intersubjective understanding. By processing learned information cognitively, we can put ourselves in the same situation, and use our imagination or past experience to evaluate the information. With the evaluated information, we perceive the person with a subjectively related understanding. Through this personally connected understanding, the higher form of empathy -- perspective taking --is established, where we can cognitively process each other's expression and its related meaning. It's worth mentioning that in the particular experiment mentioned above (Brooks & Meltzoff, 2007), young children and adults in the same group were given the same kind of blindfold. It would be interesting to see the blindfolded children observing the adults with "cheating blindfold", and the control group observing the totally blindfolded adults. There might be mismatched understandings. This kind of misunderstanding happens frequently in daily life. We might see a group of people being blindfolded and we might assume that they couldn't see because of our prior blindfolding experiences. What if their blindfolds are those special-made ones through which one could see? Metaphorically, this kind of mismatching perception occurs often in interpersonal understanding and cross-cultural experiences (Hall, 1992; Moore & Yamamoto, 2012). When a non-verbal expression means one thing in one region and another thing in other regions, movement interpretation could be controversial.

As more and more neuroscientists turn their focus on human movement (Gallese et al., 1996; Grafton et al., 1996; Decety et al., 1997; Iacoboni et al., 1999; Llinas, 2001; Calvo-Merino et al., 2004; Jarvelainen et al., 2004; Fogassi et al., 2005; Rizzolatti et al., 1999, 2001, 2002, 2006; Christensen et al., 2016), we begin to understand that the ability to predict and interpret others' actions is tightly associated with our past experiences. We

react differently according to the familiarity level of a perceived action (Calvo-Merino et al., 2004; Jarvelainen, et al., 2004; Christensen et al., 2016). Studies show that observing movement patterns that one has previously embodied activates stronger emotional association and sensorimotor representation of the movement (Calvo-Merino et al., 2004; Jarvelainen, et al., 2004; Christensen et al., 2016). I propose a hypothesis here that richer movement experiences strengthen one's interpersonal movement understanding.

In dance/movement therapy practice, reflecting and processing interpersonal movement dynamics is one of the profession's unique ways to gain relational understanding (Levy, 2005; Chaiklin, & Wengrower, 2016). Chace reflected her patients' movements through intentional mirroring (Chace, & Sandel, 1993; Fischman, 2016). She imitated their movements in her own body to gain an embodied understanding of their internal states. Chace also encouraged her group participants to try on each other's movement to create an empathic group relationship. Dance/movement therapists gain a personal understanding of a patient by embodying his/her movement externally and internally. Whitehouse reflected her patients' movements through her introspective feelings and imagery in response to witnessing their external expressions (Whitehouse et al., 2007). Both Chace and Whitehouse intentionally joined their patients' world through either outwardly embodying their movements or inwardly representing the motions. Rizzolatti and colleagues defined this kind of imitation as "response facilitation with understanding of meaning" (Rizzolatti et al., 2001, p.668). Unlike the primitive mimicry, imitation with an understanding of meaning is a more advanced way to represent the sensory mapping, movement goals and associated meaning internally, and also externally manifest the understood movement.

Below, I will unfold how motion understanding supports perspective taking and interpersonal understanding. First, I will deconstruct movement perception through the neurological lens; second, I will demonstrate the power of movement wisdom and address my hypothesis question; at last, I will discuss how motion understanding is utilized in DMT practice and how it can further support interpersonal empathy.

Neurobiological understanding of movement perception.

What is movement? Llinas states that movement is the outward expression generated by internal abstraction, such as emotions and intentions (Llinas, 2001). He calls communicative and expressive movement "prosody" (Llinas, 2001, p229), a highly coordinated silent language of expressing through the body. We use gaze, posture, gait, gesture, and facial expression to engage with each other, even in the absence of any verbal interaction (Llinas, 2001; Hari, 2007). Human movement expands from internal somatic process generated by the autonomic nervous system, to daily functional movement, and all the way to expressive art forms. Llinas boldly states that the purpose of a central nervous system's existence is to perceive and perform complex motions (Llinas, 2001). Wolpert resonates with Llinas's remark on the interdependent relationship between brain and movement, and argues that "we have a brain for one reason and one reason only, and that's to produce adaptive and complex movements" (Wolpert, 2011).

Movement is a trace-form of how we relate to the outer world and how others relate to us. Therefore, movement perception has been a key perception for humans to survive and build relationships (Llinas, 2001; Cohen, 2010). Because prosody is the external expression of the inner abstraction, perceiving an expression is a forever-

evolving process of inner/outer and self/others' integration, like reciprocal waves running back-and-forth between internal and external. Llinas defines motion perception as:

> *The functional comparison of internally generated sensorimotor images with real-time sensory information from an organism's immediate environment* (Llinas, 2001).

According to Llinas' definition, motor perception is this inner representation or understanding of the outer reality. Bainbridge Cohen claims that movement perception is the first to develop and the most crucial for survival (Cohen, 2008). It's generally believed that perception is how we relate to the sensory information we receive. Using the example described at the very beginning of this paper -- the classroom experience with my partner -- the tactile and kinesthetic sensory input showed me that my thoracic spine was cradled by her shoulder blades. With this sensory information, I perceived the cradle action she created as a soothing and cozy interaction. My perception of the cradling motion is how I relate to being embraced; the kinesthetic sensation of being cradled reminded me of pleasant memories or calming moments of being protected and cared. Therefore, my perception of that moment is personally related to my experience with such actions and sensations. Because of the cozy feeling I had being cradled by my partner's shoulder blades, I related to her with a sweet sense of being cared for at the moment. To help theorize my personal experience, I found many studies that demonstrate that how one perceives movement affects how one perceives the world (Gallese, Goldman, 1998; Llinas, 2001; de Waal, 2007; Hari, 2007; Cohen, 2008).

What is the neurological pattern of perceiving movement? According to Cohen (2008), when one perceives others' prosody, the information goes through a loop of

preconceived expectations – pre-motor focusing – sensory input – perceptual interpretation – motor-planning – sensory feedback – perceptual interpretation (Cohen, 2008, p.117). Besides receiving raw data from the external world, one processes the information with preconceived expectations and interpretation. In my experience sitting back to back with my classmate, I perceived bodily sensations with my memories and interpretations. The sensory process is more or less a mechanical system, whereas perception is personal and subjective (Cohen, 2008). To understand the pattern more clearly, picture external sensory data on one end of a polarity, and personal experiences on the other end: the process of perceiving is the constant movement between two points; the pathway, or shape of the movement, is our perception. Llinas (2001) suggests that humans and many kinds of animals understand each other's prosody by mimicking and associating through internal sensorimotor representations. This theory reminds us of the mirror neurons' role in interpersonal/interspecies understanding (Gallese et al,. 1996; Iacoboni et al., 1999; Rizzolatti et al., 1999, 2001, 2002, 2006). Through imitating movement internally, we start building our motion-meaning repertoire.

> I do this when I feel this way; I now see you doing this and so maybe you feel the same way when you are doing it. And so, over eons of trial and error, meaning between organisms evolved. (Llinas, 2001, p241)

During the first stage of intersubjective communication, we use primitive mirroring to enter each other's visceral world. But when we automatically mimic others' rhythms or shapes of the movement, we don't necessarily have to understand the meaning of the motions. Here, in this more advanced form of empathy, we imitate the motions internally or externally to find related association or meaning of such movement. When I see a

person weeping, I automatically represent such action internally; and this internal representation reminds me of being lonely and helpless, therefore I would assume that the person probably feels lonely and helpless. This is my interpretation of seeing a person weeping based on my personal experiences. If I decide to interact with the person and learn about the story behind the weeping, I might gain a new perspective of weeping. When next time I see another person weeping, I might interpret it differently than before. Thus our previous experiences affect how we interpret others' motor representations.

But, what if one sees a motor expression that one has never experienced before? Cohen stressed that preconceived expectations and perceptual interpretations are all dependent on our previous experiences (Cohen, 2008). Our previous experiences of movement enable us to predict others' intentions non-verbally. Can we strengthen our motor repertoire and perception through "eons of trial and error" of receiving and acting others' prosody (Llinas, 2001)? In the next section, we will explore more in-depth about how motor wisdom affects one's perception.

Neurocognition of movement .

The very existence of the central nervous system is a crucial property of all actively moving creatures (Llinas, 2001). "Moving through the world" is literally how humans and many other animals who possess a central nervous system survive and form communities. We perceive others' intentions and emotions through non-verbal representations; we express ourselves through movement; we are constantly moving and being moved. Scientific studies on body-mind relationships can help us to understand the profound meaning behind our moving bodies. Since the 1990s, the interest in studying such connection has increased tremendously (Gallese et al., 1996; Grafton et al., 1996;

Decety et al., 1997; Iacoboni et al., 1999; Llinas, 2001; Calvo-Merino et al., 2004; Jarvelainen et al., 2004; Fogassi et al., 2005; Rizzolatti et al., 1999, 2001, 2002, 2006; Christensen et al., 2016). However, in many mirror neuron related studies (Gallese et al., 1996; Grafton et al., 1996; Decety et al., 1997; Iacoboni et al., 1999; Fogassi et al., 2005; Rizzolatti et al., 1999, 2001, 2002, 2006), the studied motions are simple actions, such as grasping objects, finger tapping, or basic eye and mouth movement. Humans are expressive beings, and we utilize our bodies in many different ways to communicate our feelings and intentions. Our motor repertoire is far more intricate than those simple actions. Thus a small group of neurologists, who also have embodied knowledge of dance, turned their attention to studying dancers' neurocognition (Calvo-Merino et al., 2004; Blasing et al., 2010; Christensen et al., 2016). Do dancers' expertise in movement affect their motion perception? If it does, how? And how does it influence dancers' empathic ability?

Calvo-Merino and colleagues (Calvo-Merino et al., 2004) conducted a study on how motor skills affect our motor perceptions. They studied the brain activity of a group of ballet dancers, a group of capoeira dancers, and a group of inexpert control subjects watching videos of ballet and capoeira actions. The results resonate with other studies on the relationship between motor familiarity and perception (Gallese, Goldman, 1998; Jarvelainen et al., 2004; Hari, 2007): the brain activity in motor areas involved in preparation and execution of action is stronger when the subjects observe familiar motions. The set of neural regions that are more active when one watches a kinematically familiar movement includes: the premotor cortex, the superior parietal lobe and interior parietal sulcus in the parietal cortex, and the superior temporal sulcus in its posterior part.

These regions belong to “the action representation system” (Grafton et al., 1996; Decety et al., 1997). This suggests that when one observes a learned action, one recruits the action-related information from the action representation system. Through this retrieving mechanism, one receives the action-related information, which includes specific motor commands, sensory mapping, and meaning of the movement, such as memories related to the movement and learned language or name of the movement. All of these contribute to our perception of the movement. We perceive a familiar action through both visceral and cognitive understanding of it. Again, motion experience is a strong aid in motion perception, as the embodied experience offers a unique insight into the perceived motion.

Some might argue that ballet and capoeira movements are not daily motions that most people access. The essence of the study is to show that motor experience plays an important role in motor perception (Calvo-Merino et al., 2004). Therefore, it is not hard to infer that a wide range of motor repertoire provides a fuller understanding of diverse human movement. Besides the intricate action patterns, our movements are often emotionally oriented and represented. Like the apes in de Waal’s (2007) study, humans are able to recognize a peer’s emotional state through his or her bodily representations. However, similar with the role that prior motor experience plays in motor perception, our emotional response of watching others’ emotional expression varies. In Christensen et al.’s (2016) study, a group of dancers and a group of controls were instructed to watch emotionally expressive movement clips; while watching, subjects’ personal and physiological response of watching were observed and measured. The results showed that dancers demonstrated the stronger ability to modulate both behavioral and physiological sensitivity to others' affective movement. In other words, subjects with prior affective

motor experiences displayed greater empathy for others' emotional expressions, as if they were physically and emotionally going through what others were experiencing (Christensen et al., 2016). Both of these studies demonstrate that a fuller motor repertoire offers us a fuller understanding of others' external and internal expressions.

A wider range of motor repertoire suggests wiser movement cognition. Adding more styles of bodily expression into our motor repertoire is like learning more vocabulary in a language system. The more vocabulary we possess, the more precise we can understand others and also deliver our intentions; the more languages we learn, the more regions of people with whom we can communicate. Movement cognition affects how we perceive and it is a skill that can be learned. Richer movement experiences strengthen one's interpersonal movement understanding. When perceiving a familiar action, one relates to the action proprioceptively and semantically. This kind of visceral and cognitive simulation promotes mutual understanding in interpersonal communications. This would suggest that we can become more empathic through learning different kinds of movement expressions.

Movement understanding in dance/movement therapy practice.

Movement wisdom is the core of dance/movement therapy practice. Dance therapists not only help patients expand their movement repertoire for social enhancement and intrapersonal resilience, but dance therapists are also constantly learning new movement patterns and qualities to enrich our movement cognition dictionary. Laban Movement Analysis[1] (LMA) is a traditional training tool to help dance/movement therapists gain a clearer sense of self-movement-pattern and build a

[1] See footnotes

diverse movement wardrobe for therapeutic intervention (Levy, 2005; White, 2016). I believe that the most crucial aspect of studying LMA as a dance/movement therapist is that LMA provides a fertile ground for embodied movement diversity. We can access all kinds of movement qualities, shapes and sequences in different spatial structures through the training of LMA. Cathcart suggests that LMA helps therapists expand their expressive repertoire in communications with patients (Levy, 2005). According to the neurological loop of perception (Cohen, 2008), the more diverse embodied experiences we have, the richer our interpretations of the movement are. Especially when working with pre-verbal populations, taking on the non-verbal perspective of a patient is essential in building a therapeutic alliance.

Learning movement through the lens of LMA opens up one's motor repertoire. Kestenberg, whose work is rooted in LMA, asserts that every one of us is born with a unique movement temperament (Amighi et al., 1999). Along the journey of growing and living, we adopt different patterns for surviving, yet our signature characteristics are still apparent through our bodily expressions. We all have preferred movements and movements we don't like. Even in professional sports and the dance world, each discipline has its unique style of moving. A star basketball player wouldn't be an ideal candidate for a baseball team; a classical ballet dancer wouldn't be cast for a hip-pop styled show. Athletes and dancers have high movement intelligence, but they are normally trained in one particular style of motions. I, myself, was a trained gymnast for seven years and a professional dancer for thirteen years. My movement repertoire was quite limited before I encountered LMA. For example, my natural tendency to approach movement is light and round with smooth transitions. Movements with sharp edges and

strong force have always been hard for me to embody. However, embodying different qualities of movement has helped me enrich my movement experiences. I practiced the ones to which I don't have easy access and made them part of my learned memory, like musicians learning to play an instrument (Llinas, 2001). The more extensive repertoire I have, the more fully I can understand the variety of movement I perceive. As we are living in a forever-changing world, this process is continually evolving. To use Llinas's words, this loop of embodying and understanding new movement patterns is a universal way of learning through "eons of trial and error" (Llinas, 2001, p241).

As I mentioned above, forceful movement with sharp edges is not my cup of tea. Before learning to embody such a foreign quality, I had always felt threatened when I encountered a movement quality like that. I related strong piercing motions with aggression and perceived it as the sign of attacking. Once, I took a karate class: precisely controlled strong movement made me feel extremely powerful. At the moment, my fear subsided; all I could feel was warrior-like strength. I felt protected and empowered. Another time, working with my psychotherapist on a persistent fear-oriented anger, I beat the drum so fiercely and I screamed boundlessly. My forceful catharsis broke the wall of fear, and I felt so satisfied. At the moment, I understood that uncontrolled strong movement was like a force of pressured water that can break down the barriers. Not until I experienced sharp and forceful movement with positively related memories, did I start perceiving such movement quality through a totally different lens. During my internship on an inpatient unit, I once witnessed a patient becoming increasingly escalated. The patient was under two-to-one supervision, thus he was followed by two therapy aides around the clock. One day, he became agitated with the staff who were watching him. He

yelled at the staff forcefully and his body movement became tense and sharp. He started to walk to different spaces on the unit to try to “get away” from the staff. All attempts to separate from them failed and his body became inwardly tense. My understanding of his prosody was that he felt threatened by two muscular male staff who were constantly watching him; his body tension was a self-defense response; his fierce yell was a form of catharsis; he used his body strength to empower himself in a very vulnerable situation. I was able to put myself in his condition and imagine how I would feel or react. In that case, I retrieved my bodily mapping and related memories of performing intense movement from my past experience to understand him. Instead of judging him as being escalated or aggressive, I empathically felt his fear and frustration in my body.

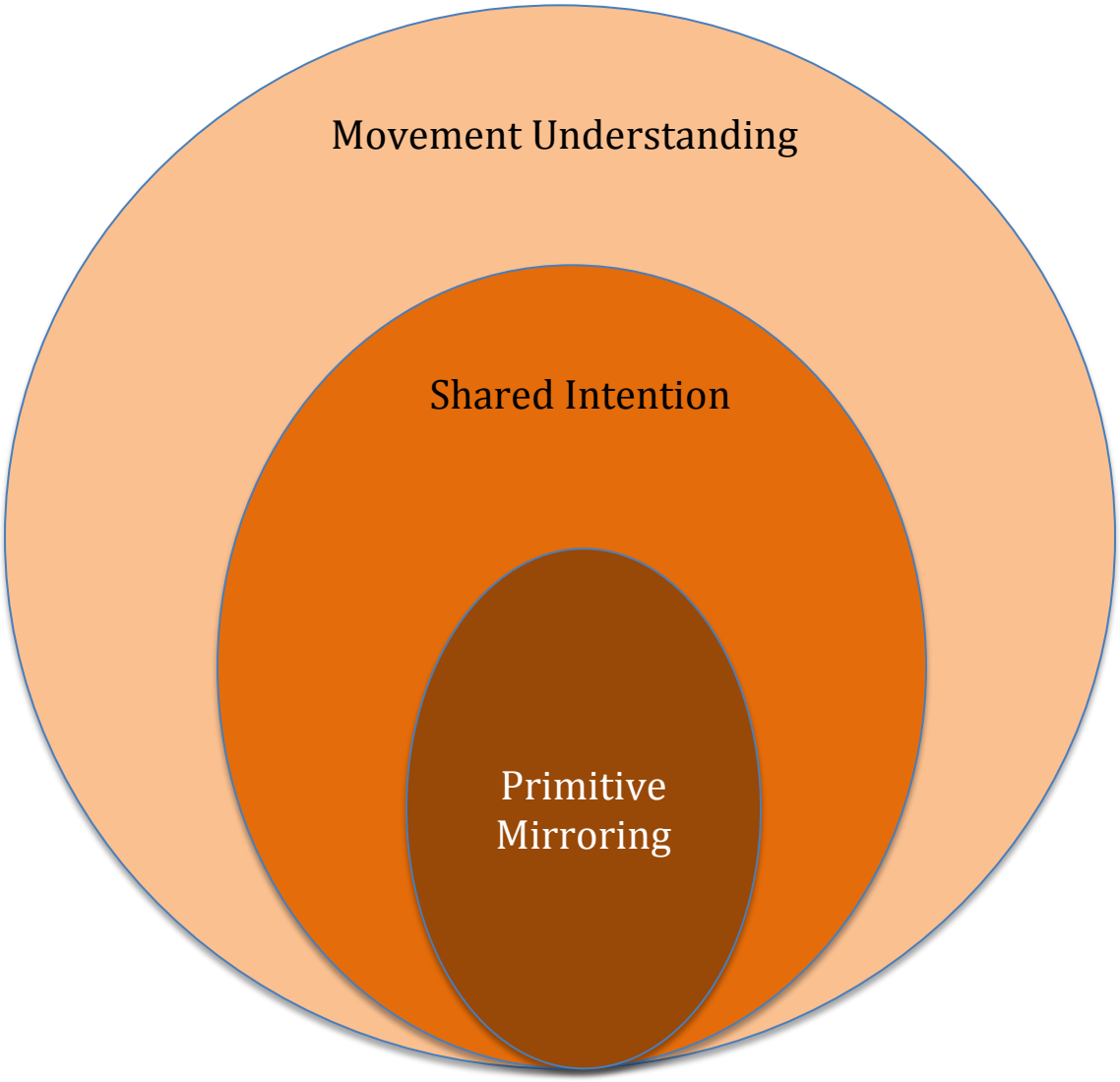
Imagine if I were still fearful of strong movement, I would have felt nothing but fear in that situation. Because I had been able to experience forceful movement in different contexts, I could draw on those memories to interpret this patient’s body tension and intense vocalization. We can become more empathic through learning different kinds of movement expressions. By embodying various styles of prosody, our movement repertoire expands as well as our empathic range. As we are absorbing different ways of moving, we are becoming more and more adaptive to different kinds of human expressions. With a variety of bodily experiences, we are able to perceive the world through a diverse lens of acceptance.

From primitive mimicry to cognitive perception, we are empathic creatures who want to share each other's bodily expressions and understand others’ non-verbal motions. The reason that we have the urge to console the person who seems sad is that we all have experienced sadness on various levels and, in the moment, we can feel the other’s need

intersubjectively. However, perception is subjective. It's like a custom-made dress that only suits the person for whom it's made. I had one patient who suffered from schizophrenia. Whenever asked to do a movement of his own, he always showed one movement, which was an alternative wrist rotation with two hands. He did it so quickly and effortlessly that the movement became mesmerizing. I watched it in wonder and tried it on my body. I am a trained dancer, and I couldn't do the rotation as fast as he did. I also felt exhaustion from doing this repetitive rotation. But when I looked at him, there was only joy and excitement. In this case, I have never experienced any life-threatening visual and audio hallucinations like he has had. Thus this frantic wrist rotation made me feel exhausted yet brought joy to him. I may learn from him that the repetitive joint rotation motion had a satisfying effect on him and the experience allowed him to stay present. Ever since this experience with him, I would greet him with this fast wrist rotation and it always evokes a big smile and an exciting scream from him. I can't simply conclude that we can fully understand each other through intentional movement imitation. But, embodying others' bodily expressions shortens our distance. This idea reminds of me of Stanislavski's Method acting training (Stanislavski, 1938). The Russian modern theater titan Konstantin Stanislavski made "experiencing a role" the central point of his actor training method. Through active observation, he suggested that an actor should physically imitate an observed character and eventually act and think like the character, as if becoming one with the role. This method has shown a profound meaning of interpersonal understanding: to understand a person's internal abstraction, one has to start from careful observation and imitation.

Everyday, we dance therapists encounter new physical patterns from new patients or old patients. We learn new physical traits and their associated meanings through interacting with them. We gradually add learned patterns into our motor repertoire to enrich our perception. More and more, we perceive new patterns with some more generous preconceived expectations and interpretations (Cohen, 2008, p.117). Our Reciprocal Waves keeps evolving: the symbolic meaning of interpersonal understanding stands as a body of water flowing back-and-forth between people; the more it flows, the more understanding we get from each other; the ever-flowing Reciprocal Waves connect us as a collective body. We would never fully understand the other person, but we could bridge the gap and be one with the other.

Reciprocal Waves Framework and Discussion



After extensive research into structuring and enriching this framework, it's time to make a summary of what we have gone through. The graph shown above is a basic structure of Reciprocal Waves. As it is inspired by de Waal's Russian doll model of empathy (de Waal, 2003, 2007), the form is designed to demonstrate the evolutionary layers of building empathic communication through movement. Primitive mirroring stands as the core of interpersonal exchange: I open my mouth to express my excitement of seeing you---I see your mouth open and I open my mouth to feel how you feel -- I feel

you feel me. This is where the first wave starts dancing in between a dyad. With the fundamental exchange evoked by primitive mirroring, we expand our horizon to the world around us. Shared intention is developed upon the unconscious motor mimicking: I move the chair to fence this monster -- I see you moving a chair to fence the foreign monster, and I want to join you to help fence it together -- I see you help me fence the monster, and I feel joined and supported. Now the waves created between us are shaped by one shared intention. This is the basis for social cooperation. As we keep evolving, we grow to have the need to know why a person is crying. Through understanding others' external expression, we come to a richer understanding of their internal state: I see you weeping alone; I feel lonely and helpless when I weep; therefore you might feel the same feeling as I feel when I weep alone. This is movement understanding. We embody others' physical traits to gain an access to their inner beings. These three stages support colorful, flexible, and dynamic Reciprocal Waves.

It is important to note here that the real events of formulating empathic communications are intricately interwoven. This sequential style of displaying the intricate information is to organizationally demonstrate various layers of intersubjective communication. Reciprocal Waves is designed for presenting the simple yet profound concept of building empathic relationship through movement. This is an educational model that could be utilized in professional training for educators, clinicians, hospitality workers, journalists, or lawmakers, among others. An embodied intersubjective communication is the key to a harmonious relationship. It could also later be developed into a conflict resolution method for cultivating empathy between two clashing groups or people. I personally care very much about resolving conflict, first, because the saying of

"harmony is the most precious" from Confucian culture is deeply embedded in my belief system, and second, because I experienced many conflicts within my family that weren't properly resolved. The unresolved family conflicts stay in our bodies and affect later generations' relationships. To extend this concept further, unresolved conflicts between two countries or two ethnic groups can have the similar impact on us. Cultivating empathy through Reciprocal Waves could be the first step of establishing mutual understandings between two opposing groups. Initiating an intersubjective communication is like building a bridge that connects two isolated islands. Connection makes movement possible in between these two polar points. When we start changing positions, feeling what the other is feeling, thinking what the other is thinking, we know that resolution is not far.

With my background in performing arts and passion in public art, I do see this framework as a performance score that can be applied in any small or large scales of public theater experiment. The first development would be Primitive Mirroring: each performer chooses one audience member and starts imitating whatever the audience member is expressing at the moment. As this develops, performers begin paying attention to what other performers are doing. They join with a performer or a group of performers' imitation based on interest. Gradually, groups emerge. Leaders among each group alternate among group members. Each leader takes the group to different spatial origins and exaggerates or abstracts the imitation. Naturally, a shared intention is formed among different groups or one big group. As this "follow the group leader" theme goes on, each group leader would start verbalizing what they see objectively, such as "I see your red sweater," "I see you moved your fingers," or "I see your curly hair." Then group

members would follow up with subjective comments in popcorn style, such as “it reminds of me of…” “I hate red,” or “curly hair is sexy,” etc. This would be the movement understanding section. Transitions are made organically as each group’s developing rhythm.

The same score can be used in group-conflict resolution. Instead of imitating audience members, the groups would imitate each other’s non-verbal expressions.

Right now you might question whether what I am talking about here is too far from dance/movement therapy. Dance/movement therapy principles are formed on the fundamental understanding of dance/movement as a healing power in human society. As the first group of homo sapiens formed a circle to sing and dance for social bonding, we know that dance is essential in community forming and flourishing (McNeill, 1995). Although dance/movement therapy is a young profession in western establishments, dance has been a relationship-bonding tool for thousands of years (McNeill, 1995). As I went through the training program of becoming a dance therapist, I was repeatedly reminded of the fundamental power of dance/movement. The profession of dance/movement therapy is not introducing something new, but rather recapping something old---so old that we have rarely forgotten its power in modern society. This is what Reciprocal Waves stands for: retelling some of the fundamental elements in human relationship building. No matter where dance therapists work, we are there to remind people of the simple yet profound doing of social bonding through expressive arts. The fundamental ability to feel what others feel is not only necessary in clinical work, but it’s also how we form societies as humans. We are constantly moving and being moved. This push and pull action prepares human infants to explore the world, and metaphorically

formulates human empathic communication. The reciprocal waves continuously dance between us forming stories, arts, communities, and humanity.

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Footnotes

[1]Rudolf Laban was an influential choreographer and movement theorist at the beginning of the twentieth century (Hodgson & Preston-Dunlop, 1995). He studied human movement extensively and composed a method to notate dance movement (Hodgson & Preston-Dunlop, 1995; Laban, 2012). Deriving from the notation aspect of observing movement, Irmgard Bartenieff, one of his disciples, extended and developed the Effort/Shape branch of the theory in America (Bartenieff, & Lewis, 2002). This branch is now called Laban Movement Analysis (LMA). Through the lens of LMA, we observe and embody movement in different body parts, spatial structures, moving qualities and external shapes. LMA has been used in many fields of studies, such as developmental psychology, dance/movement therapy, psychotherapy, Artificial Intelligence, anthropology, movement study, etc. (Davis, & Hadiks, 1994; Amighi et al., 1999; Bartenieff, & Lewis, 2002; levy, 2005; Bloom, 2006; Chaiklin, & Wengrower, 2016; Shafir et al., 2016).